MEDICAL, WEST

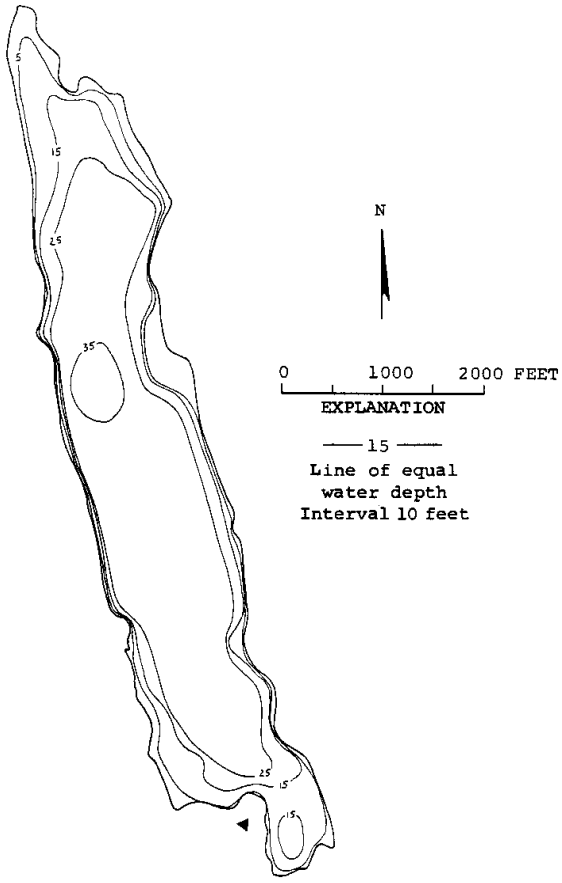
SPOKANE County

Lake ID: MEDSP2

Ecoregion: 7

West Medical lake is a very eutrophic lake located approximately 30 miles southwest of Spokane. It is one of the few lakes in the state with a permitted waste water discharge.

Area (acres)	*Maximum Depth (ft)*	*Mean Depth (ft)*	*Drainage (sq mi)*	
220	35	22	2	
Volume (ac-ft)	***Shoreline (miles)***	***Altitude (ft abv msl)***	***Latitude***	***Longitude***
4900	3.98	2423	47 33 42.	117 42 06.



Medical, West Lake, Spokane County. From
Washington Department of Game, February 3, 1955.

Station Information

MEDSP2

Primary Station	Station # 1	latitude: 47 34 28.6	longitude: 117 42 33.4
	Description:	Deep part of lake approximately 500 feet east of a white slumped bank on west shore	
Secondary Station	Station # 3	latitude: 47 34 11.9	longitude: 117 42 28.1
	Description:	Approximately 750 feet west of east shore hospital access	
Secondary Station	Station # 2	latitude: 47 34 44.9	longitude: 117 42 40.3
	Description:	Northern end of lake in approximate center of a line extending from the east shore to the west shore about 2500 feet south of northern tip of lake	

Trophic State Assessment for 1998

MEDICAL, WEST

Analyst: KIRK SMITH

TSI_Secchi:	38	N
TSI_Phos:	120	
TSI_Chl:	53	
Narrative TSI:[a]	E	

West Medical Lake is one of the few lakes in Washington State which receives a waste treatment plant discharge. Because of this, the lake is unusually high in nutrients. The lake shoreline is mostly natural and the watershed is mostly agriculture with large wheat fields close by. The west shore is undeveloped with wheat fields some 200 meters back from the lake. The east shore is undeveloped except for a picnic access. There is a boat rental place/fishing dock and a large public access on the south end; there is a pumphouse on north end. The lake has a 50 mph speed limit but we seldom saw boats exceed trolling speed during our sampling visits. The lake is a popular fishing lake and the zooplankton population appears to be healthy and supportive of a good sport fishery. Aquatic plants were thick in places; coontail (Ceratophyllum demersum) was dominant. The water clarity was surprisingly good considering the sizeable nutrient load within the lake. Wildlife were diverse and abundant. Unlike Medical Lake, a mile to the east, West Medical Lake is not typically used for primary contact recreation, though we do not know what uses would be if water quality were better. The abundant vegetation and nutrients do not appear to greatly interfere with current uses, though too much vegetation may interfere with forage by predator fish or be so thick that it is impenetrable even by the smaller prey fish. It can also potentially interfere with fishing. Hydrogen sulfide odor was observed very deep in the water column (8 meters) and there were many blue-green colonies (probably Mycrocystis) but again, these typical indicators of poor water quality do not appear to impact the current uses of the lake. An aerator has been operated in the lake in the past.

In 1992, Willms, R. and G. Pelletier reported high fecal bacteria near the treatment plant outfall, mean TPs of 2.35 mg/L (max 2.8), and mean TN of 1.68 (Impacts of Eastern State Hospital and Lakeland Village Wastewater discharges on the quality of West Medical Lake, Washington State Department of Ecology, 36 pp.). In 1998, we

found no high fecal bacteria concentrations, much higher TP concentrations (epilimnion mean 3.03, whole lake max 4.91) and a similar TN concentration (1.36). Willms and Pelletier reported evidence of significant internal nutrient loading; internal loading was even more pronounced during our study, perhaps because thermal stratification was greater.

There are plans to redirect the treatment plant outfall out of the lake in the near future.

West Medical Lake is almost certainly nitrogen limited with TN/TP ratios below 2. (Nitrogen limitation would also explain why the mean Secchi and chlorophyll concentrations were so much lower than mean TP concentrations would indicate.) Pending a more thorough study, we recommend that a nitrogen criterion for West Medical Lake be set at current levels plus a correction for inter-annual variability: 1.36 mg/L (= mean 1.20 mg/L + std. dev. 0.16).

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[a] E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

MEDICAL, WEST

Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro-phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
6/16/1998		L					1 U			
		L					1 U			
7/14/1998		L					19			
		L					1 U			
8/11/1998		L					1			
		L					1 U			
9/15/1998		L					1 U			
		L					1 U			
Station 1										
6/16/1998		E	3310 J	.912	0	7.3		164		1
		H	3590 J	.99	0					
7/14/1998		E	3000	1.36	0	12.3				.8 J
		H	4000	1.78	0					
8/11/1998		E	2750	1.42	1	16.4				1.4 J
		H	4330	1.83	0					
9/15/1998		E	3050	1.13	0	12.4				.8
		H	4910	2.86	1					
Station 2										

7/14/1998	E	2900	1.33	0	10.6
9/15/1998	E	2680	1.12	0	11.3
Station 3					
8/11/1998	E	2840	1.28	0	13.2
	H	2630	1.31	0	13.8

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Watershed Survey

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Survey Date: 9/15/1998

Land Uses (1 = Primary, 2 = Secondary, etc.)

- [2] **Agriculture(commercial, not hobby)**
- [1] **Commercial, Industrial**
- [ ] **Major transportation**
- [ ] **Residential**
- [ ] **Park, forest or natural**

Impervious surfaces (Roads and parking area): No Curbs

Observations (check mark denotes presence)

BMP's ☐

Cattle and horses have access to low-lying areas but not sure if the areas are upstream or down.

Odors ☐

Cattle ☐ **Ducks** ☑ **Geese** ☐

Ducks are all over.

Fertilizers and weed killers appear to be used in residential or agriculture area ☑

Wheat fields and at prison

Buffer zones around streams and wetlands ☐

Irrigation ☑

north end of lake

Survey Id: 75

Habitat Survey Summary Report

MEDICAL, WEST

Data are averages of ***10*** **Stations Surveyed** **Date of Visit:** 7/14/1998

Vegetation Type (Avg. only of sites w/ vegetation present; 1=coniferous, 3=deciduous)

Canopy Layer Avg:	0.7	**Number of stations with canopy:**	10
Understory Avg:	2.3	**Number of stations with understory:**	10

Percent Areal Coverage (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

Canopy Layer:	**trees > 0.3 m DBH**	1.3
	trees< 0.3 m DBH	0.6
Understory:	**woody shrubs saplings**	1.3
	tall herbs, forbs grasses	2.3
Ground Cover:	**woody shrubs seedlings**	1.5
	herbs, forbs, grasses	2.8
	standing water or inundated veg	0.7
	barren or buildings	0.5
Substrate Type (within shoreline plot):	**bedrock**	0.7
	boulders	0.4
	cobble/gravel	0.4
	loose sand	0.0
	other fine soil/sediment	0.9
	vegetated	3.4
	other	0.0
Bank Features:	**angle (O:<30; 1: 30-75; 2:nr vertical)**	0.7
	vertical dist (M from wtrln to high wt):	0.2
	horiz. dist. (M from wtrln to high wt):	0.1

Human Influence (0 = absent, 1 = adjacent to or behind plot, 2 = present within plot)

buildings	0.2
commercial	0.0
park facilities	0.0
docks/boats	0.1
walls, dikes, or revetments	0.0
litter, trash dump, or landfill	0.7
roads or railroad	0.4
row crops	0.1
pasture or hayfield	0.7
orchard	0.0
lawn	0.0
other	0.1

Physical Habitat Characteristics

station depth (at 10 m from shore)	2.4

Bottom Substrate (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

bedrock	0.3
boulders	0.3
cobble	0.0
gravel	0.0
sand	0.0

silt	3.3
woody debris	0.6

Macrophyte Areal Coverage (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

submergent	3.2
emergent	1.4
floating	0.2
total weed cover	3.3
Do macrophytes extend lakeward (-1 = yes, 0 = no)	-0.8

Fish Cover (0 = absent, 1 = Present but sparse, 2 = moderate to heavy)

aquatic weeds	1.9
snags	0.3
brush or woody debris	0.6
inundated live trees	0.1
overhanging vegetation	0.2
rock ledges or sharp dropoffs	0.2
boulders	0.3
human structures	0.0

Questionnaire

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Results compiled from 1 **Surveys.** **Average time (years) respondents spent on lake:** 12.00

Did the following add (+1), detract (-1), or have no effect (0) on your enjoyment of the lake today?

Types of WaterCraft:	0.0	View:	0.0	Distance to Lake:	0.0
Public Access:	0.0	Swim Beach:	0.0	Canada Geese:	
Water Clarity:	-1.0	Water Qual. for Swim:	0.0		
Fishing Quality:	0.0	Aquatic Plants:	-1.0		

On a scale of 1 (poor) to 5 (excellent), how would you rate water quality today? **2.0**

Which would you rather have, 1 or 2?

1) Better fishing and more natural habitat, or 2) clearer water?	2.0
1) Better fishing and more natural habitat, or 2) fewer aquatic plants?	2.0
1) Clearer water, or 2) fewer aquatic plants?	1.0

How important is each of the following characteristics to you (1 = very undesirable, 5= very desirable):

Restricted Watercraft:	3.0	Good Warmwtr Fishing:	3.0	Natural Scenery:	3.0
Plant Growth:	1.0	Good Swimming:	3.0	Public Beach:	3.0
Natural Shoreline:	3.0	Less Algae:	5.0	Canada Geese:	3.0
No Odors:	3.0	Public Access:	3.0		
Good Coldwtr Fishing:	3.0	Clear Water:	5.0		

Tabulated Results

Survey ID	Date	Residency	Rent or Own	Primary Activity*	Water Clarity: Purchase Factor?	Water Clarity: Has it Changed?	Water Clarity: When?
62	8/11/1998	Visitor		2	☐	Worse	1987

* 1=canoe/kayak, 2=fish, 3=pers. wtrcrft, 4=mtrboat, 5=sail, 6=swim/wade, 7=watch wldlf, 8=ski, 9=windsurf, 10=relaxing

Zooplankton Report

MEDSP2

Date 8/11/1998 Station: 1 Sample ID 11

Cladoceran appear daphnia-like but lack the long spine, distinct eye-spot and head. Looks like giant Ostracod but has obvious Cladoceran features. More round than oval. Most likely D. schodleri

Number of organisms measured: 72

Group	Percent
Cladoceran	100.0%
Copepod	
Other	

Group	Percent
Small < 1mm	81.9%
Large >= 1mm	18.1%
Ratio of large to Small:	0.22
Average size (mm):	0.76

Aquatic Plant Data

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Sampler: Parsons, O'Neal

Survey Date: 7/14/1998

Max depth of growth (M): 4.5

Comments Sunny, breeze. Much long thin blue-green algae in water. Ceratophyllum is dominant submersed plant. Animals observed include: many duck families (dabblers and greebes). Raccoons on shore. Ruddy ducks, osprey, heron, geese, many blackbirds, some dead fish floating, gold fish, turtle. Conducted habitat survey for Kirk Smith. Heavy algae growth on some plants (deeper ones), forming surface scum unprotected areas. Water level seems up, all Ponderosa pines along shore are dead.

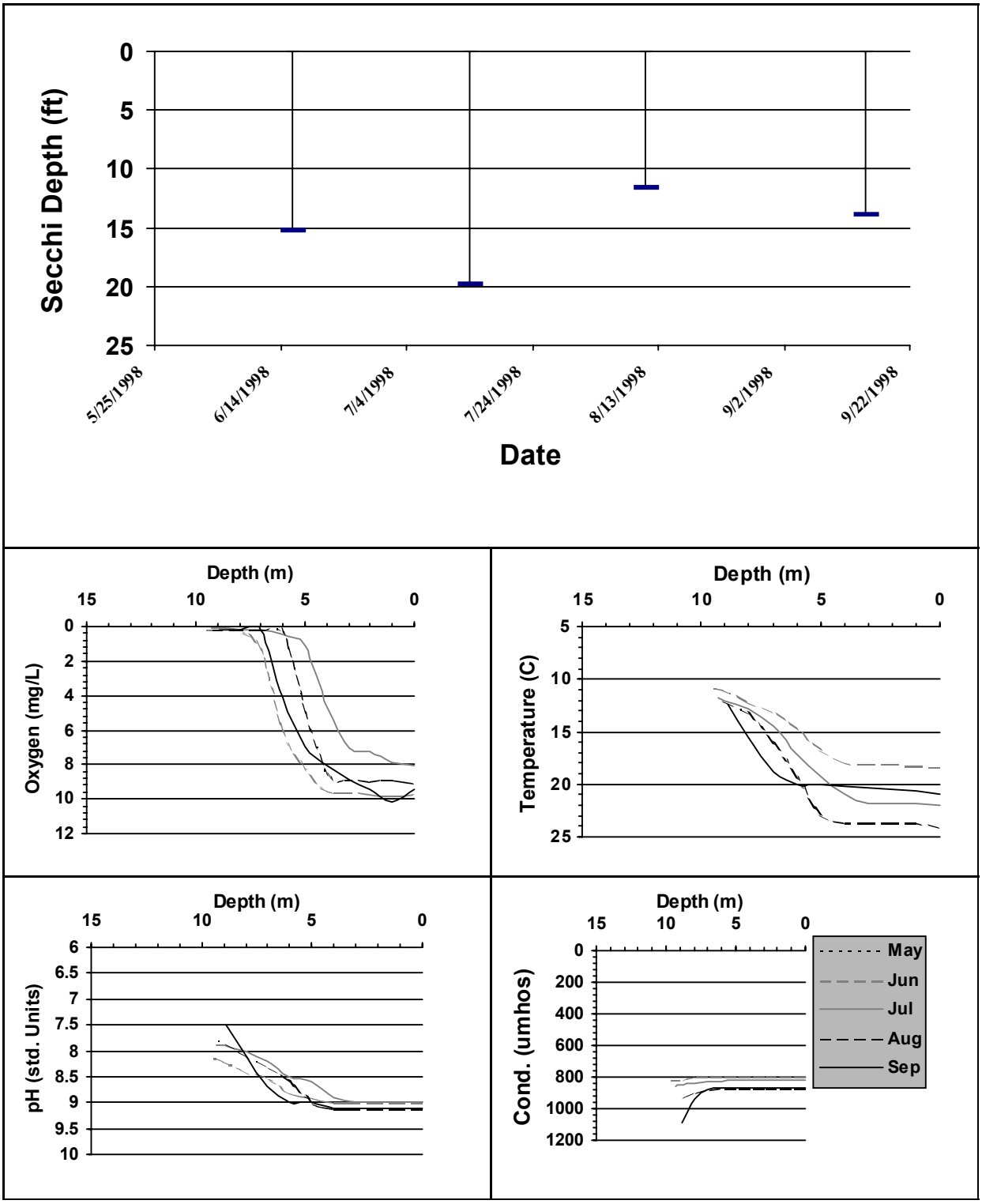
SPECIES LIST

Scientific Name	Common Name	Dist [a]	Comments
Ceratophyllum demersum	Coontail; hornwort	4	dominant in much of lake, forming surface mats
Lemna sp.	duckweed	2	more common at south end
Myriophyllum sibiricum	northern watermilfoil	2	blooming
Phalaris arundinacia	reed canarygrass	3	along shore
Potamogeton crispus	curly leaf pondweed	2	patches along west and east shores
Potamogeton pectinatus	sago pondweed	3	some dense stands
Potamogeton pusillus	slender pondweed	1	not much, fruiting
Scirpus sp.	bulrush	2	
Typha sp.	cat-tail	2	

[a] 0 - value not recorded (plant may not be submersed)
1 - few plants in only 1 or a few locations
2 - few plants, but with a wide patchy distribution
3 - plants in large patches, codominant with other plants
4 - plants in nearly monospecific patches, dominant
5 - thick growth covering substrate to exclusion of other species

Secchi Depth and Profile Graphics

Station: 1 MEDSP2



Secchi Data and Field Observations

MEDICAL, WEST

Date	Time	Temp-erature (F)	Secchi (ft)	Color (1-greens, 11-browns	Bright-ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5-good)	Swimming (1-poor, 5-good)	Geese (#)	Waterfowl (besides geese #)	Boats-Fishing (#)	Boats-Skiing (#)
Station 1													
6/16/1998			15.18	3	0	1				6	7	9	0
	Sampler: HALLOCK			Remarks: APHANIZOMENON BLOOM IN PROGRESS. NO BLUE-GREEN AT 6M BUT LARGE DAPHNIA. NO BIOTA AT 8M									
7/14/1998			19.8	6	5	1		3	3	30	31	4	0
	Sampler: HALLOCK			Remarks: COWS ALONG SHORE. LOTS OF ALGAL CLUMPS W/OCCASIONAL APHANIZOMENON FLAKES. GOLDFISH OBSERVED									
8/11/1998			11.55	3	0	1		3	1	0	17	2	0
	Sampler: HALLOCK			Remarks: MODERATE APHANIZOMENON BLOOM									
9/15/1998			13.86	6	0	1		3	1	0	23	2	0
	Sampler: HALLOCK			Remarks: COLONIAL ALGAL BLOOM EVIDENT--SAMPLE TAKEN. H2S SMELL EVIDENT AT 8M AND ON ANCHOR.									
Station 2													
7/14/1998			19.8	6	0	1				0	0	0	0
	Sampler: HALLOCK			Remarks:									
Station 3													
8/11/1998			12.21	3	0					0	0	0	0
	Sampler: HALLOCK			Remarks:									
9/15/1998			13.2	6	0					0	0	0	0
	Sampler: HALLOCK			Remarks:									